

# **Exploring Land Processes and Climate Variations through Giovanni**

Suhung Shen and James Acker

# Remotely Sensed Land Products in Giovanni

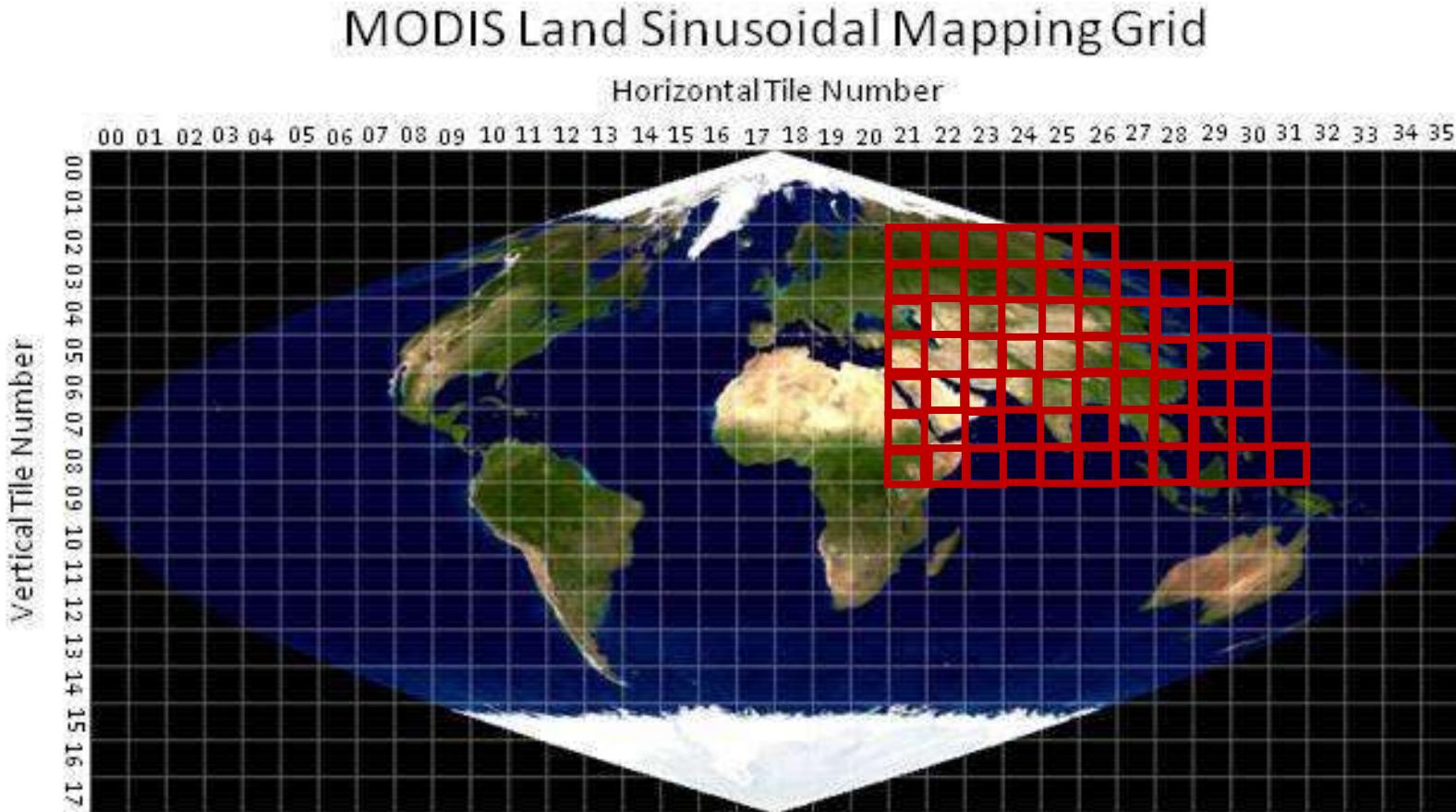
- Land Cover Types/Dynamics (MODIS)
- Vegetation Index (MODIS)
- Land Surface Temperatures (MODIS)
- Soil Moisture (AMSR-E)
- Snow/Ice Occurrence Frequency (NESDIS/IMS)
- Active Fires (MODIS)
- Surface Albedo (MODIS)
- Nighttime Lights (DMSP-OLS)

<http://disc.sci.gsfc.nasa.gov/mairs/data-holdings>

# Spatial Resolutions of Products

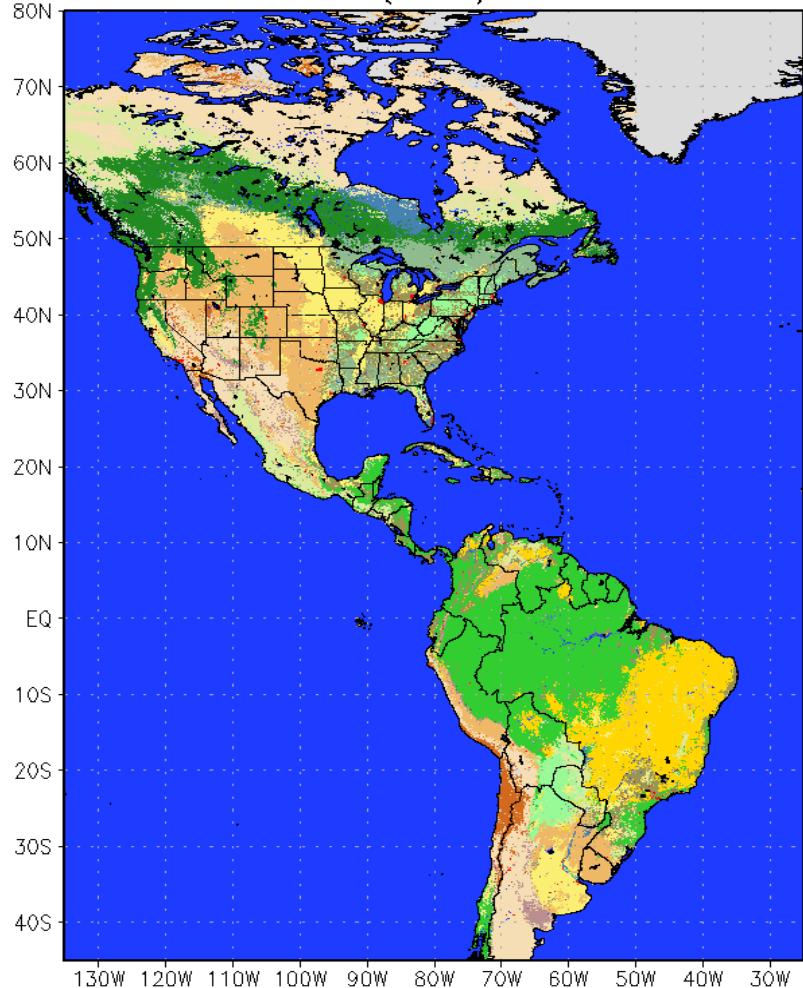
- **Low resolution:** 1x1 deg (LST, VI, Fire, Soil Moisture, Snow/Ice), global coverage , spatially aggregated from original global higher resolution data (mostly 0.05x0.05 deg)
- **Medium resolution:** 0.05x0.05 deg (LST, VI, Albedo), global coverage , standard products created by science team
- **Higher resolution:** 1x1 km (LST, Fire) or 0.5x0.5 km (Land Cover Types) over Asian region only ( $0^{\circ}$ - $60^{\circ}$ N,  $60^{\circ}$ E- $150^{\circ}$ E) , processed from original tiled data files and projected to cylindrical equidistance map projection

# Preprocessing Higher Resolution Data



# MODIS Land Cover Types at 5.6km Resolution

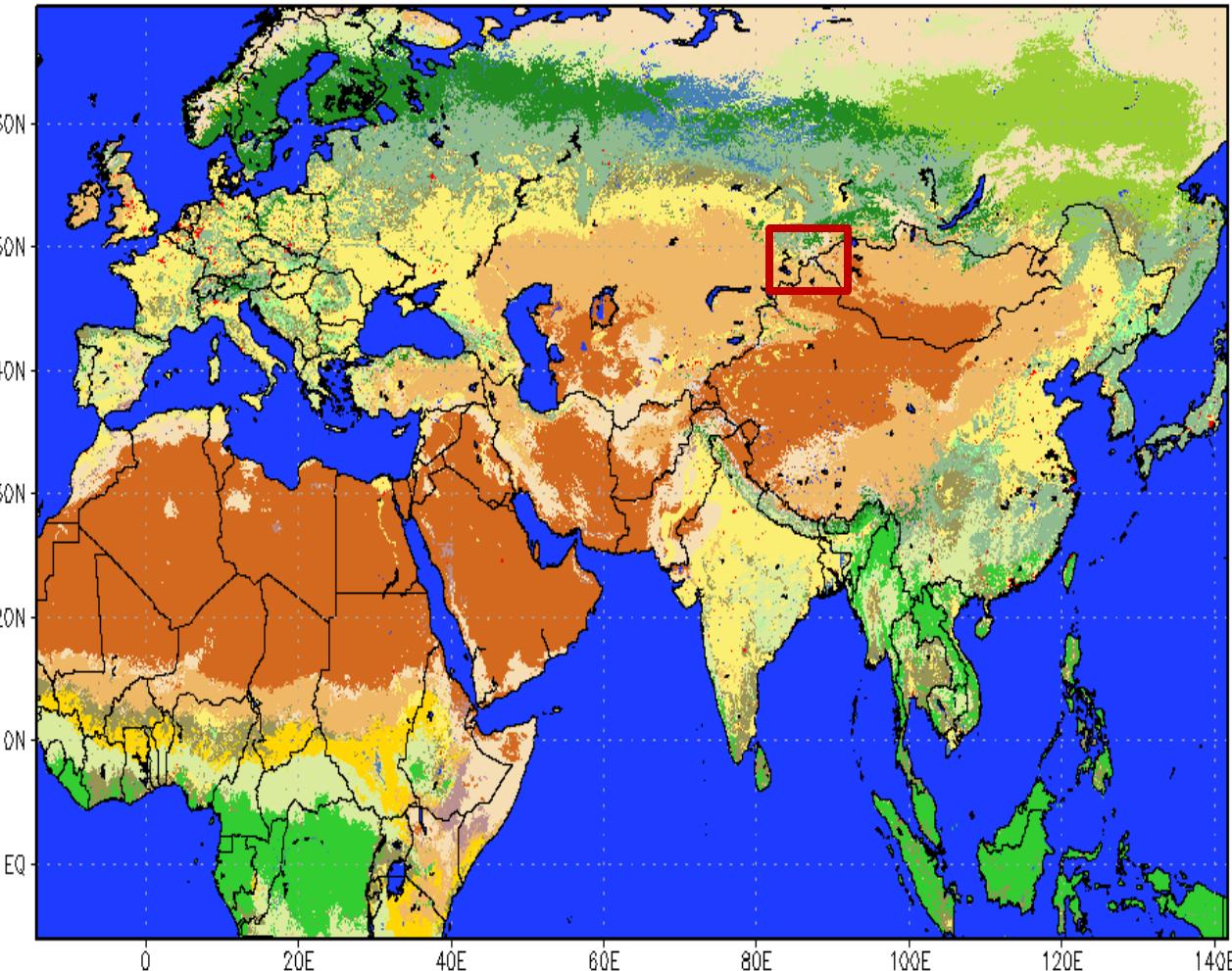
12C1.005 Majority Land Cover Types (IGBP) 5.6km [class]  
(2009)



- 16=barren\_sparse\_vegetated
- 15=snow/ice
- 14=cropland/natural\_mosaic
- 13=urban\_built-up
- 12=croplands
- 11=permanent\_wetlands
- 10=grasslands
- 9=savannas
- 8=woody\_savannas
- 7=open\_shrublands
- 6=closed\_shrublands
- 5=mixed\_forest
- 4=deciduous\_broadleaf
- 3=deciduous\_needleleaf
- 2=evergreen\_broadleaf
- 1=evergreen\_needleleaf
- 0=water

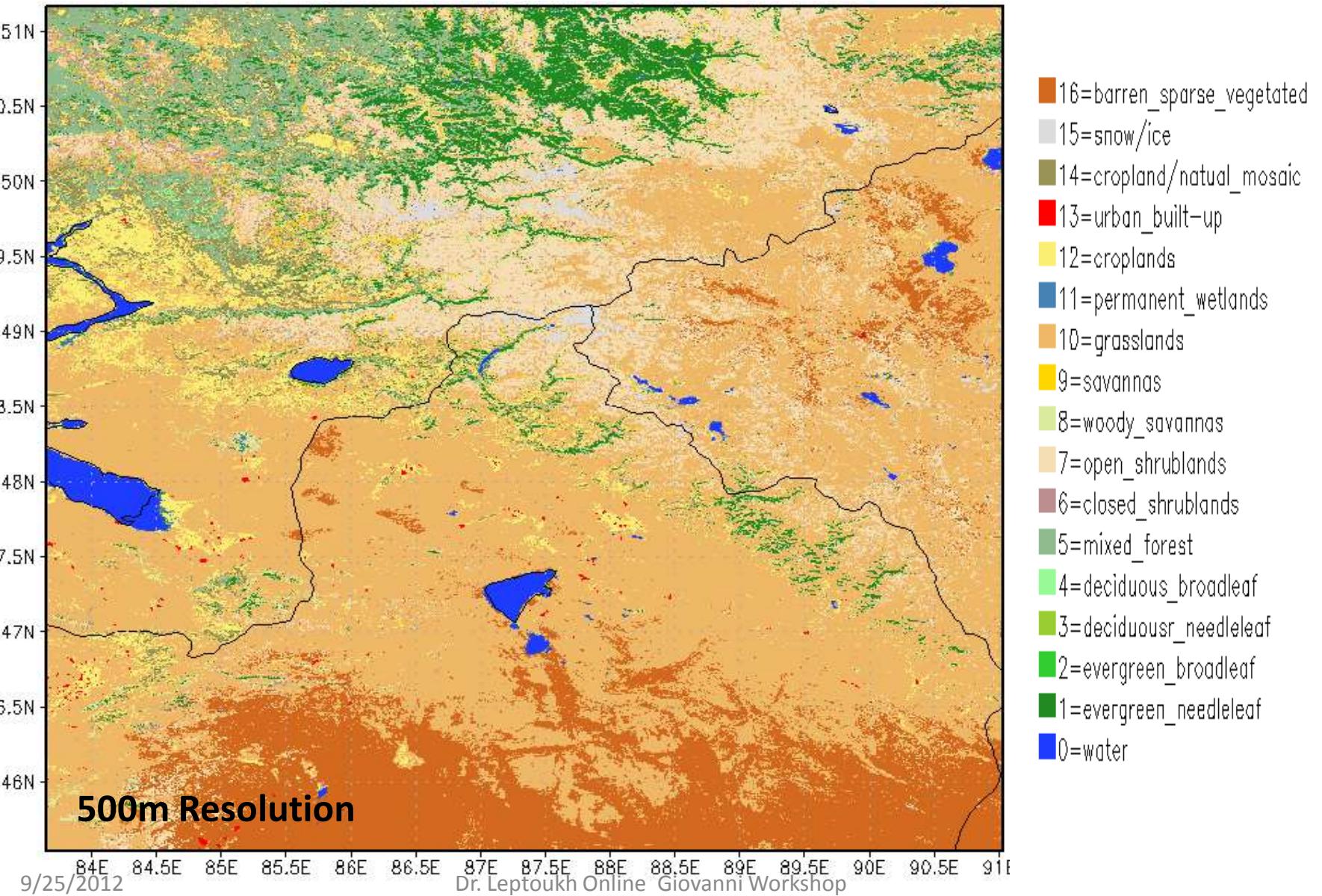
# MODIS Land Cover Types at 5.6km Resolution

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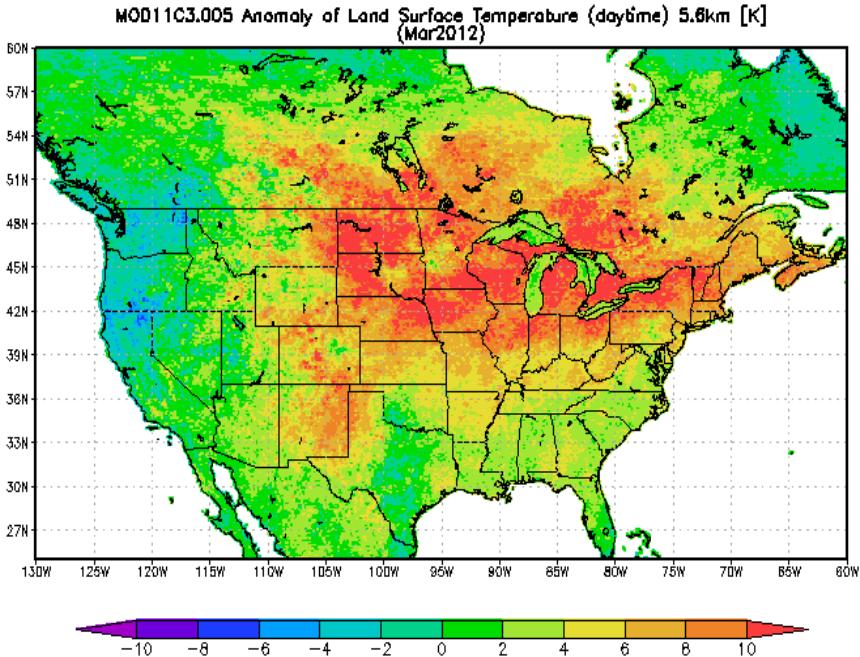


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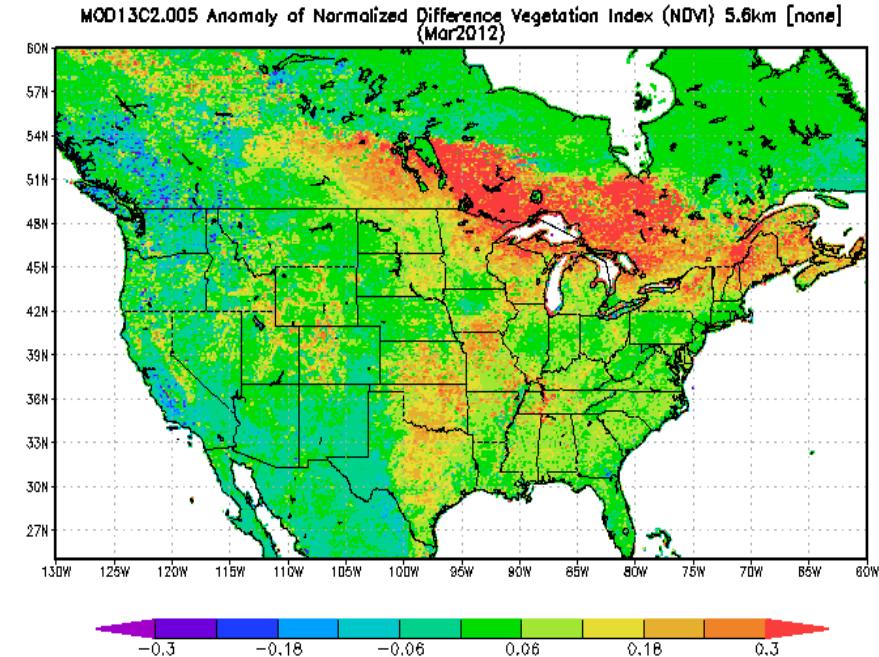
# MODIS Land Cover Types at 500m Resolution



# Anomalous Surface Temperatures and Greenness Over Northern American in Early Spring 2012

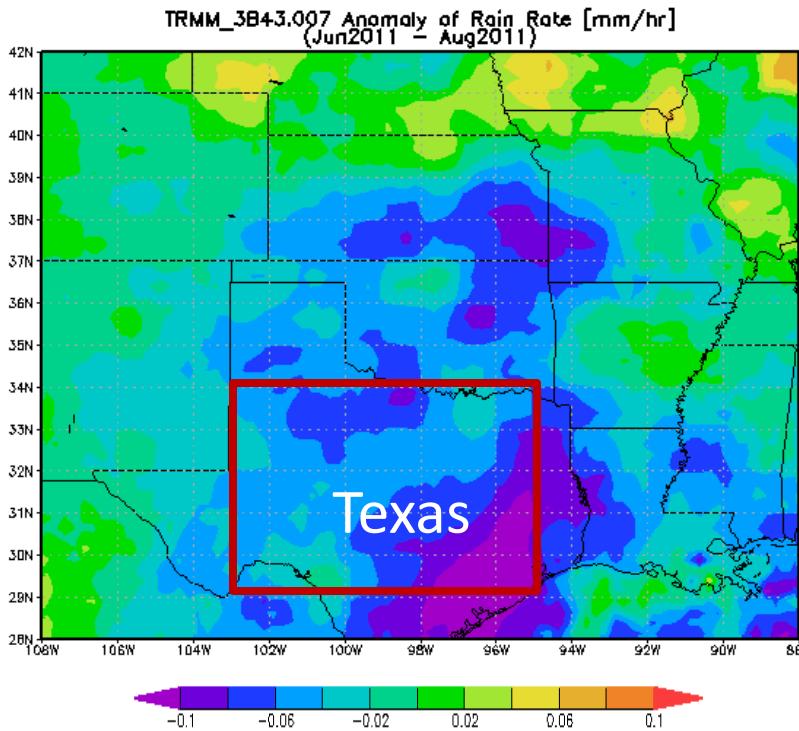


MODIS-Terra land surface temperature anomaly, March 2012, 0.05deg resolution

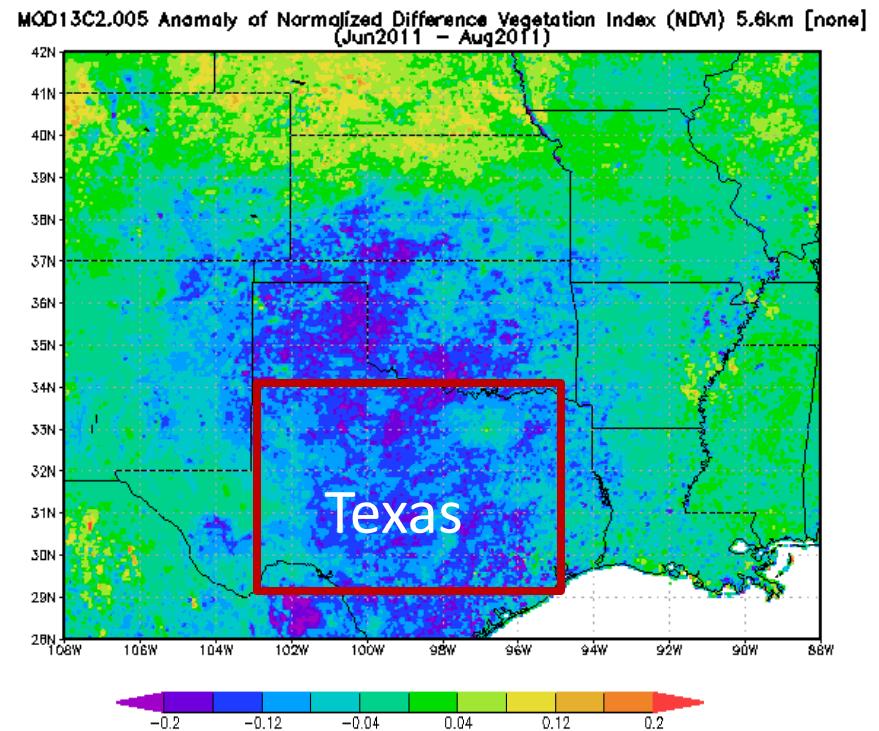


MODIS-Terra NDVI anomaly, March 2012, 0.05 deg resolution

# Drought and Weaker Vegetation Index over American Southwest in Summer 2011

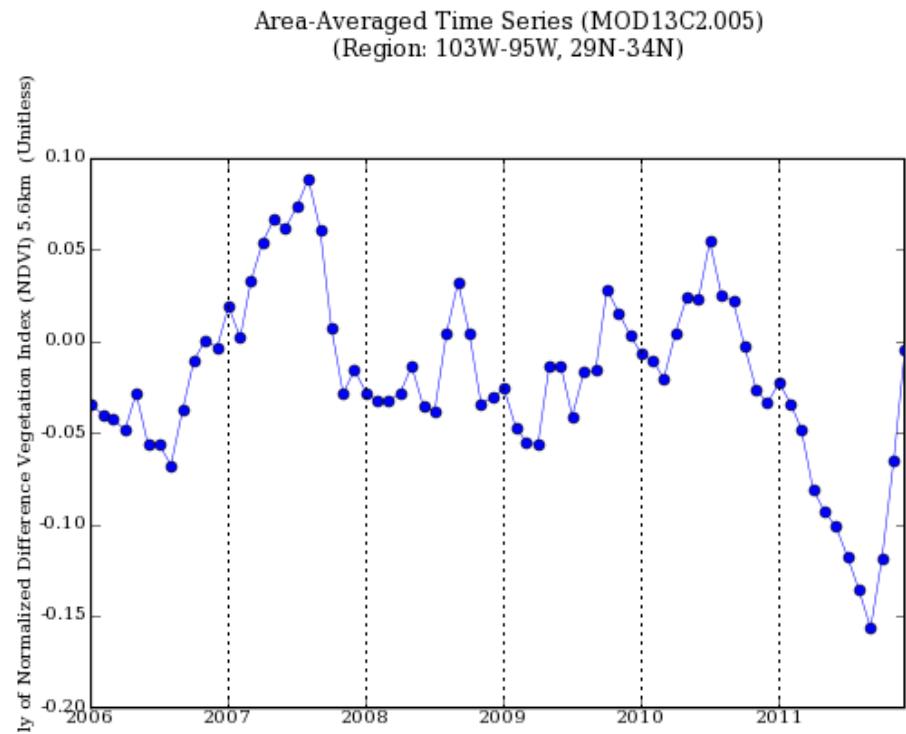
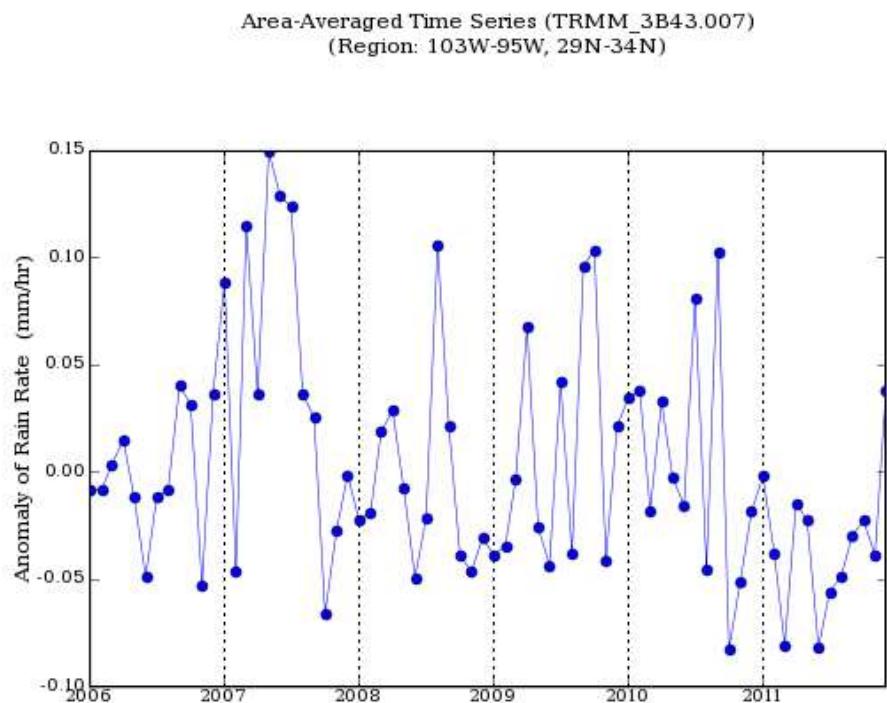


TRMM Precipitation rate anomaly,  
Jun-Aug 2011, 0.25 deg resolution

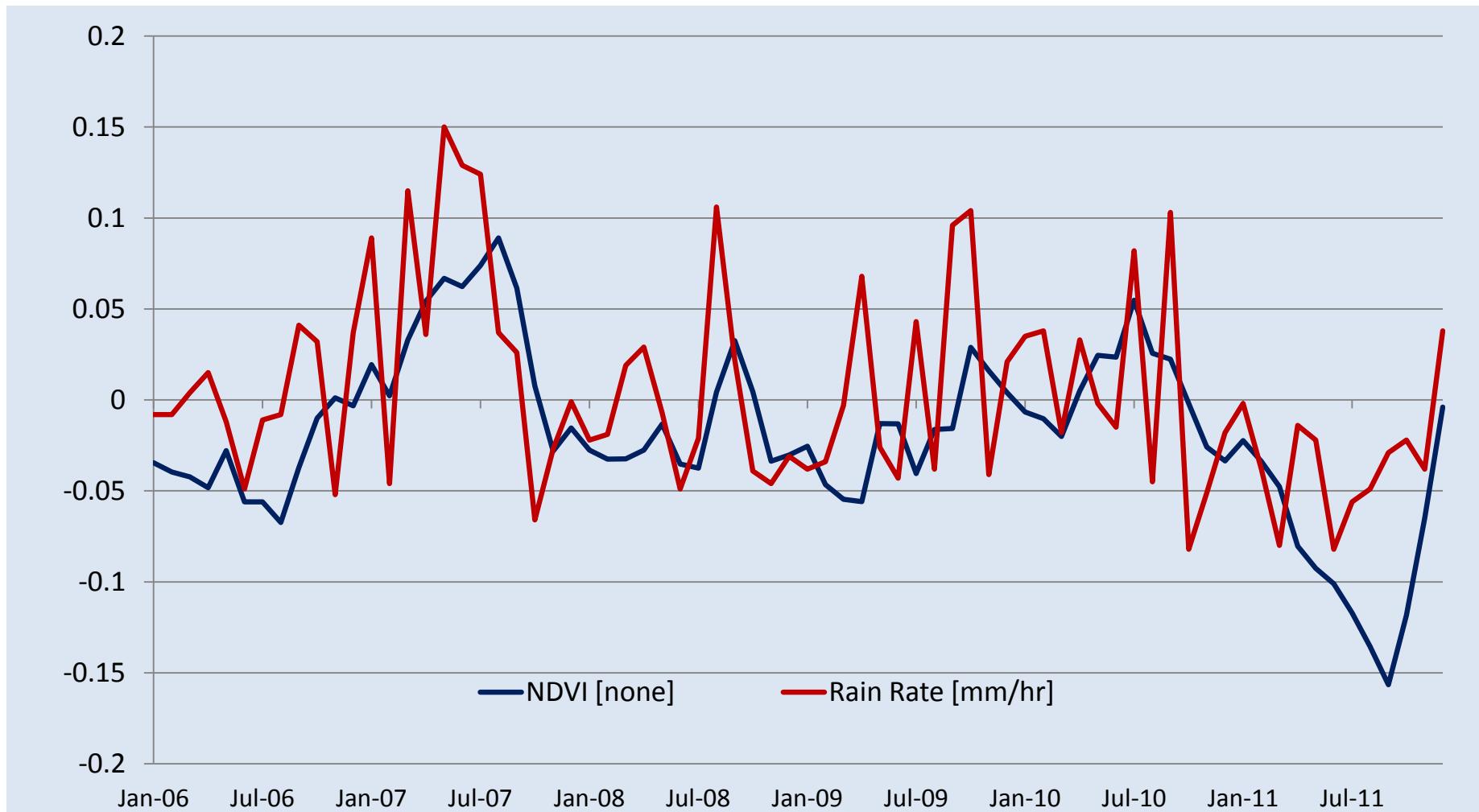


MODIS-Terra NDVI anomaly, Jun-Aug  
2011, 0.05deg resolution

# Time Series of Monthly Anomaly TRMM Precipitation and MODIS-Terra NDVI

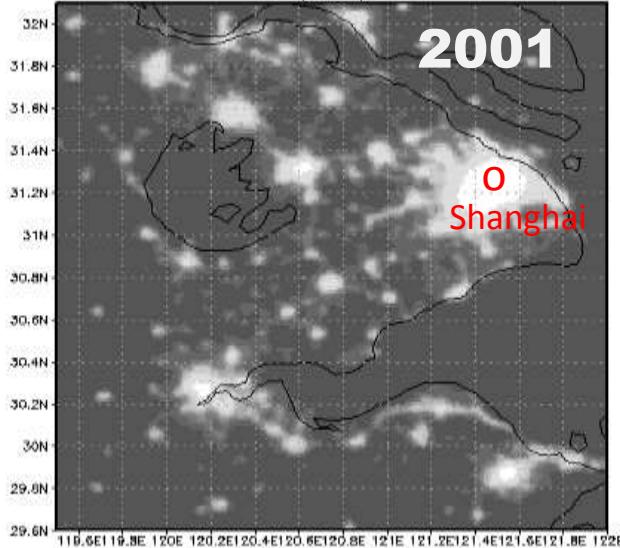


# Time Series of Monthly Anomaly TRMM Precipitation and MODIS-Terra NDVI

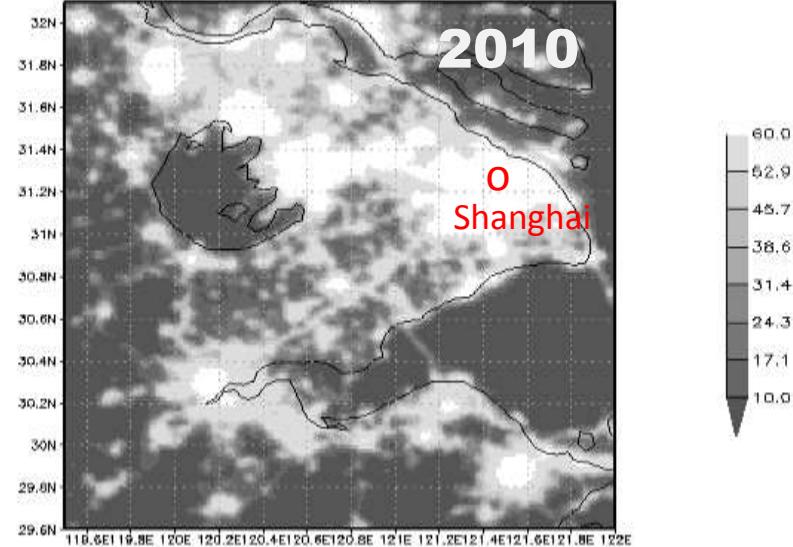


# Exploring Urban Heat Island Effect

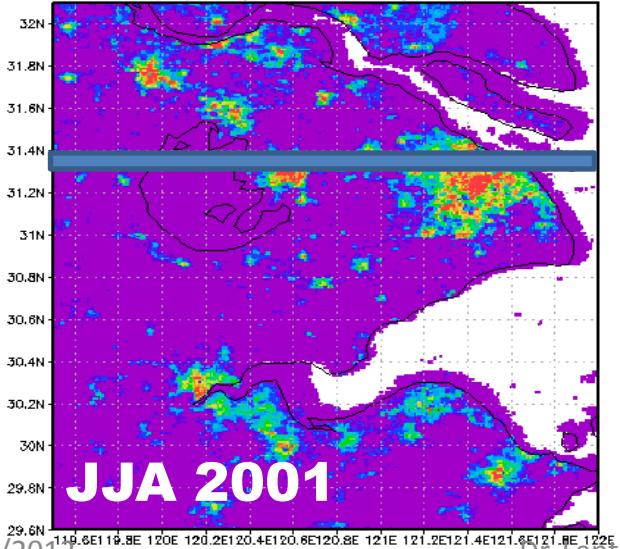
F15NLGT\_MAIRS.004 Stable Nighttime Lights 1km F15 [none] (2001)



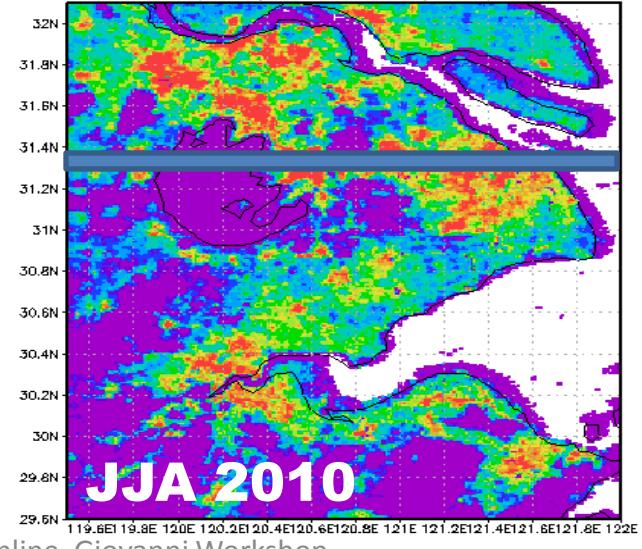
F18NLGT\_MAIRS.004 Stable Nighttime Lights 1km F18 [none] (2010)



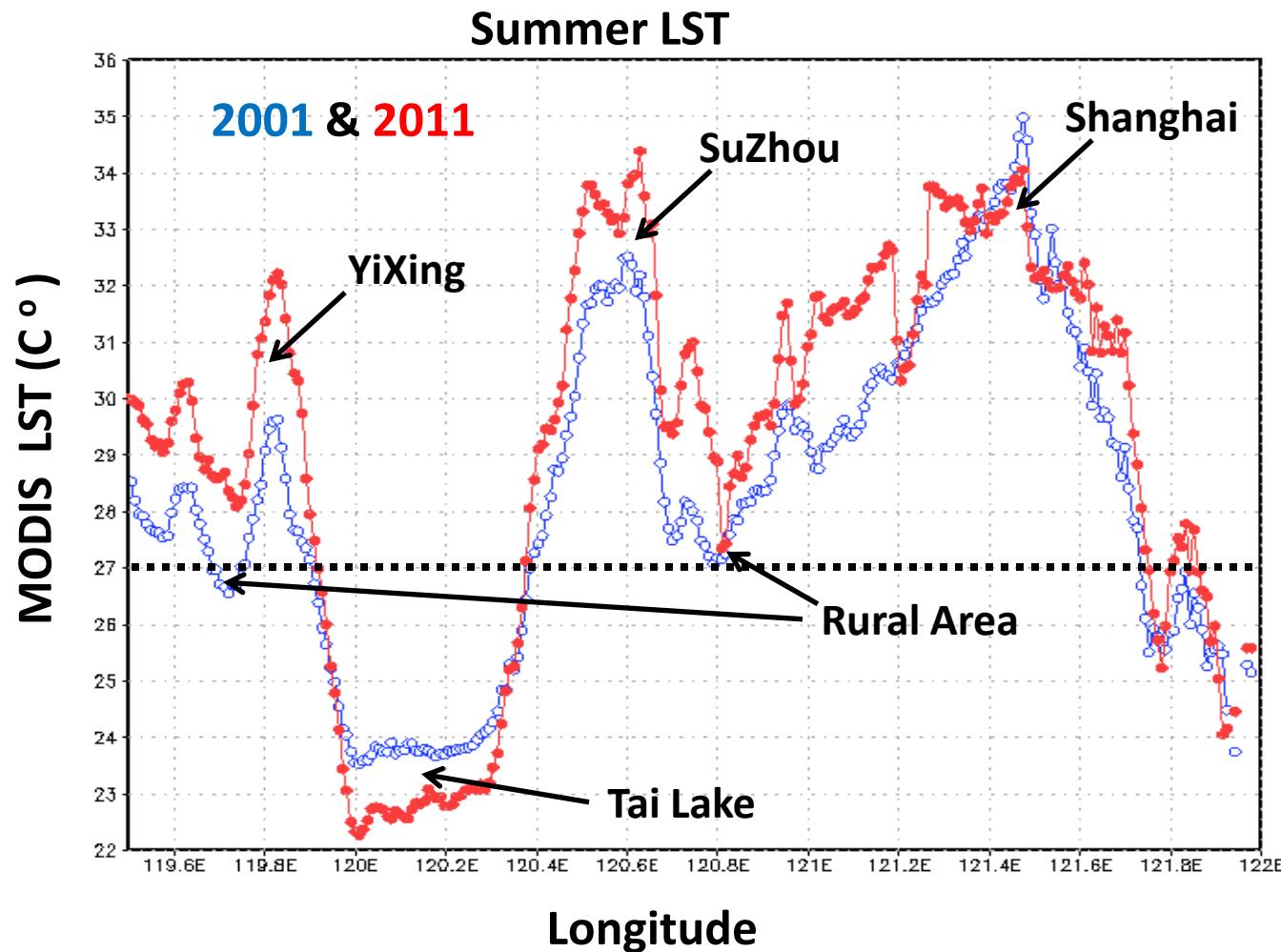
MOD11A2\_MAIRS.005 Land Surface Temperature 1km (day) [K] (25May2001 – 29Aug2001)



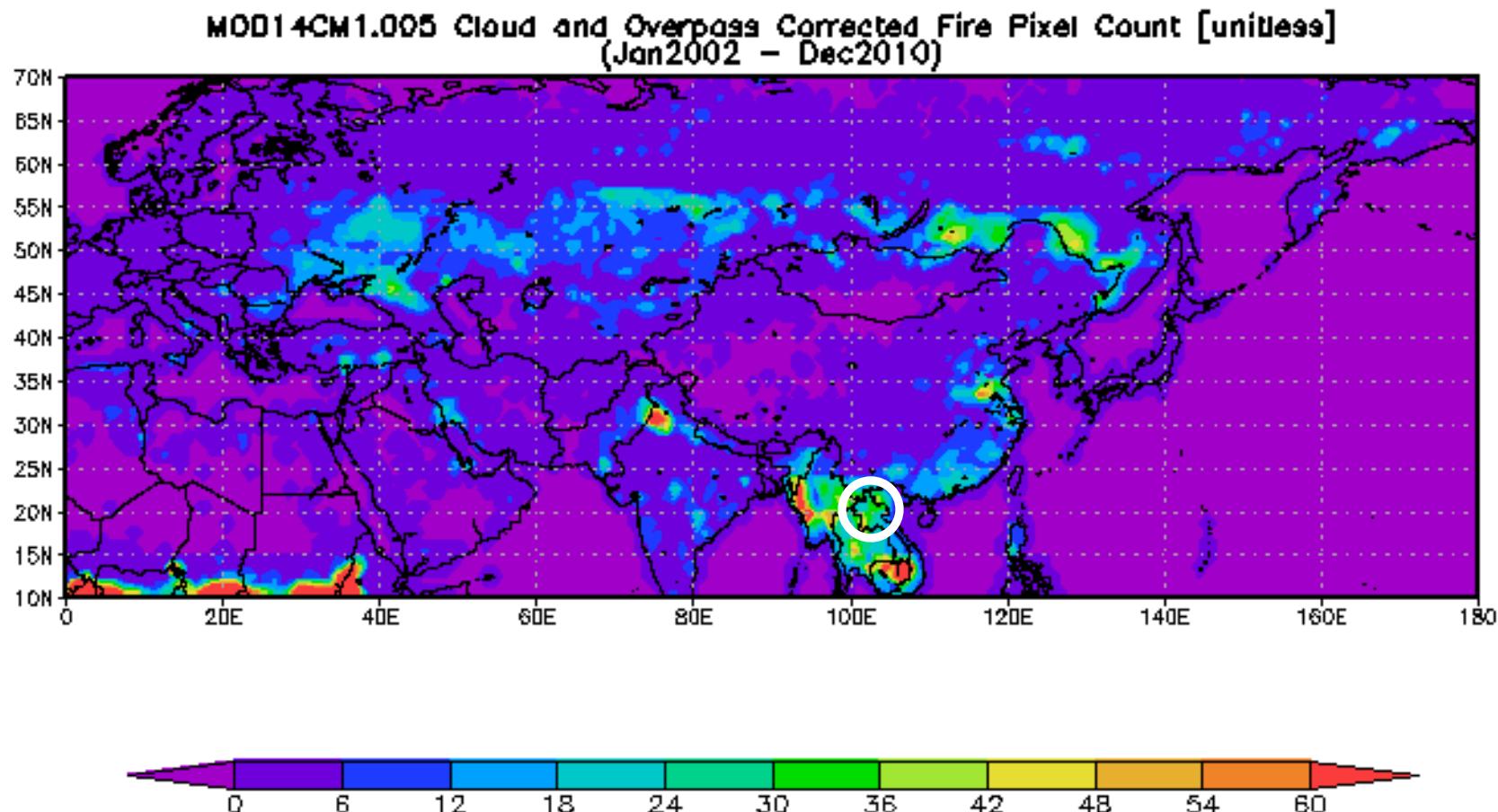
MOD11A2\_MAIRS.005 Land Surface Temperature 1km (day) [K] (25May2010 – 29Aug2010)



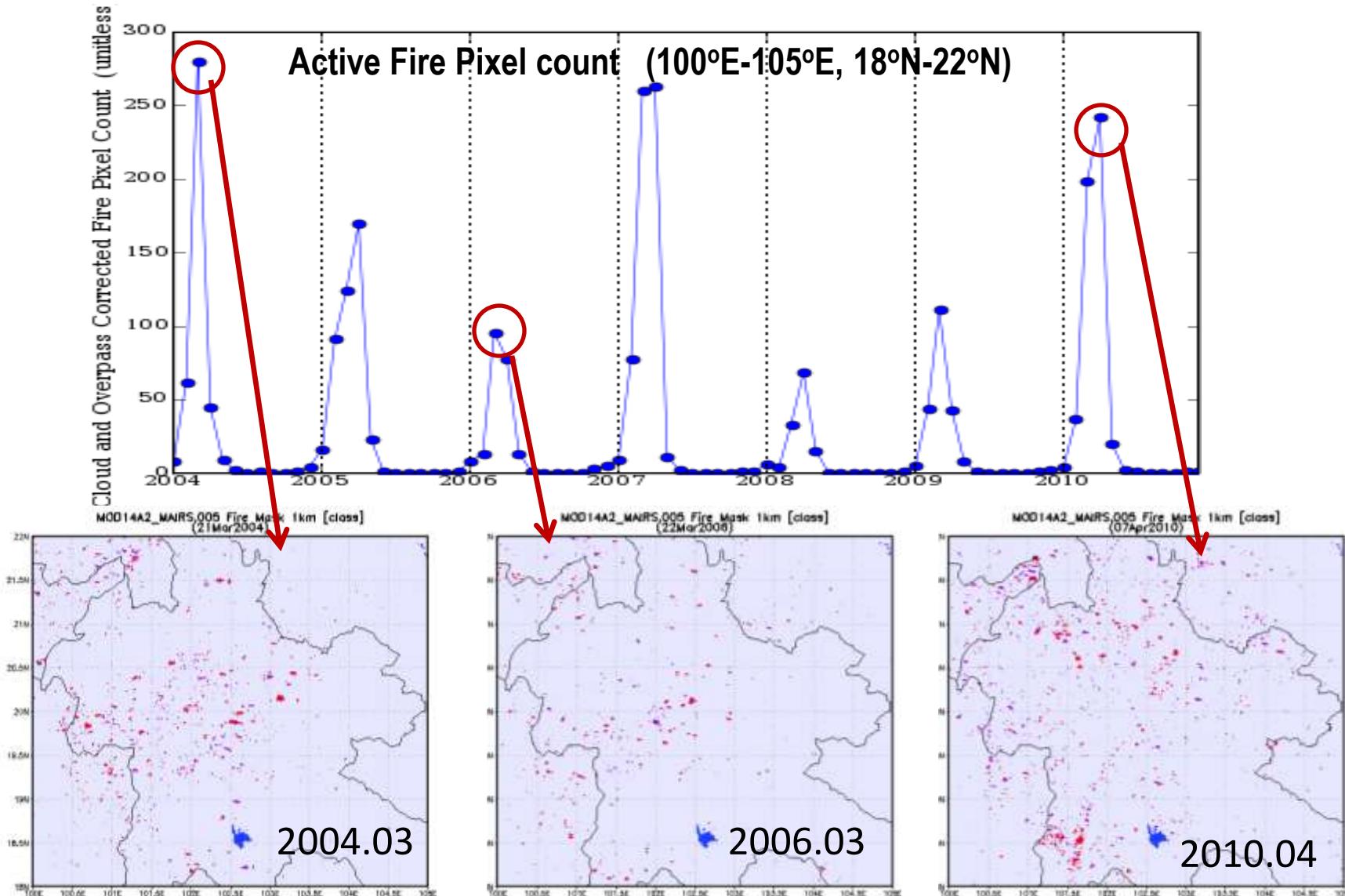
# Exploring Urban Heat Island Effect – Continue



# Averaged Active Fire Pixel Counts (2002-2010)



# Interannual Variations of Fires over South Asia



**Locations of Active Fire Mask at 1km Resolution**

# **Giovanni Land Portals:**

<http://disc.gsfc.nasa.gov/giovanni>

→ Application and Education portals

# **Project Portals:**

GES DISC MAIRS: <http://disc.gsfc.nasa.gov/mairs>

GES DISC NEESPI: <http://disc.gsfc.nasa.gov/neespi>